Nova Scotia
Department of
Mines and Energy

REPORT ON THE ENGLISH PROPERTY

(McKeen Quarry), PICTOU COUNTY

OFR 87-023

by

G. B. Dickie

Mineral Development Division
Nova Scotia Department of Mines and Energy
September 1987

Canada - Nova Scotia
Mineral Development Agreement

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INTRODUCTION

The English property is approximately 150 acres in the east end of the town of Pictou, Pictou County (Fig. 1). It is bounded on the south by the Beeches Road and on the north by the Boundary Line Road. It is accessed by woods roads from both the north and south sides. An old building stone quarry is located in the central part of the property and can be reached by woods road from the Beeches Road (Fig. 2). The quarry has been known as the Fogo or McKeen quarry and supplied stone for a number of buildings in Pictou County in the late 1800's and early 1900's. In 1986 the Nova Scotia Department of Mines and Energy drilled 3 holes in the old quarry to determine the remaining reserves of building stone. This work was done as part of a province wide evaluation of Nova Scotia's building stone resources under the Canada - Nova Scotia Minder Development Agreement. More recently, additional testing was carried out on the drill core and quarry samples to determine the suitability of the sandstone for rip rap, fill and coarse aggregate. The results of this work is compiled in this report.

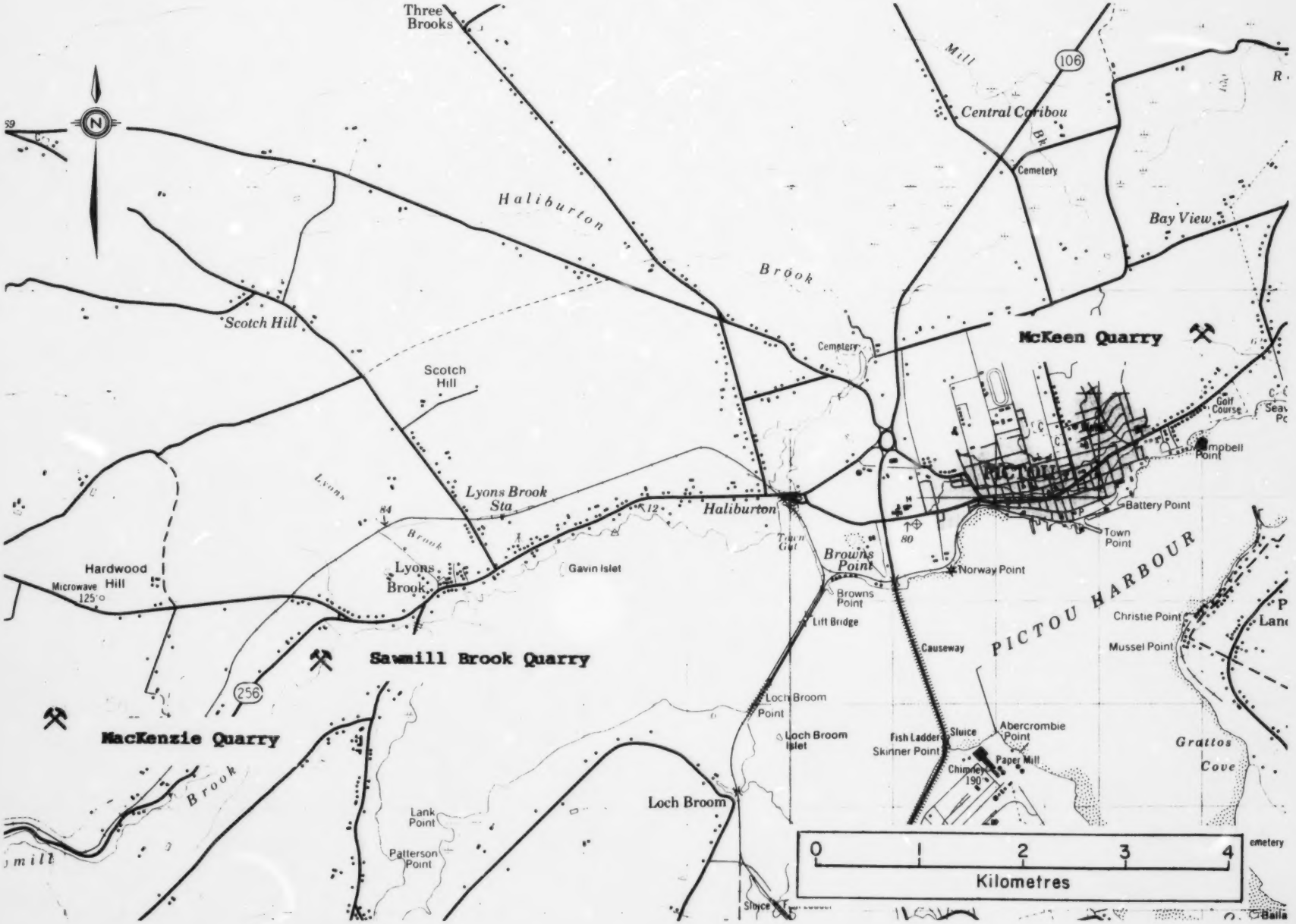


Figure 1. Pictou County dimension stone quarries.

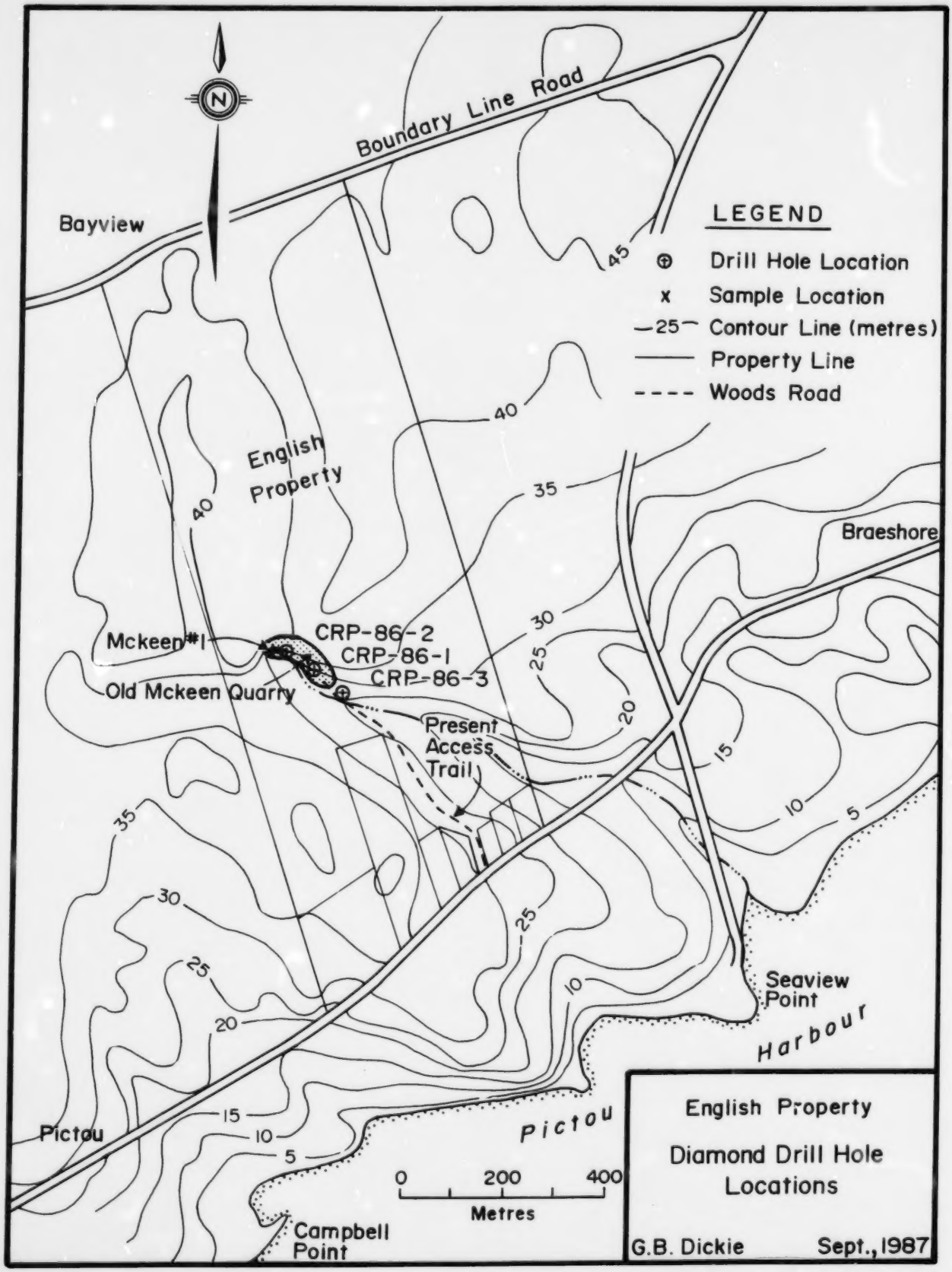


Figure 2. Diamond drill hole locations, English Property, Pictou County.

LOCAL GEOLOGY

The Pictou area is underlain by mid-Carboniferous sandstone, siltstone and shale of the Boss Point formation. The rocks strike northwest and dip 8° to 10° to the northeast. Regionally the Boss Point formation is predominantly sandstone with interbeds of siltstone, shale and lag conglomerate. The sandstone beds are trough cross stratified and tabular. Deposition probably took place in moderate to low sinuosity, meandering sand dominated streams.

EXPLORATION PROGRAM RESULTS

Introduction

The old McKeen quarry has not produced building stone for at least 75 years. It has, however more recently, been used as a source of fill rock. As a result there is a 8 metre exposure of sandstone on the high wall and 3 to 6 metres of overburden overlying the sandstone and a large stockpile of overburden. The old building stone quarry is presently filled with water and overgrown.

The object of this exploration program was to determine if the sandstone exposed in the quarry extends to depth and to determine through laboratory testing the suitability of the stone for fill aggregate. It is apparent that a large volume of sandstone occurs north of the quarry and positive results returned from the quarry rock could be extrapolated over the remainder of the property.

Diamond Drill Program

A Longyear 38 diamond drill was utilized for this project using BQ size rod for wireline recovery of drill core. The core measures 1 7/16" in diameter and was placed in wooden boxes consisting of five sections of core, five feet long. The core was carefully logged to determine the rock type, colour, grain size, joint frequency, bedding angles, etc. Sampling was carried out using a common core splitter. Pieces of core from the relevant sandstone sections were removed from the boxes and split; one half was returned to the box, the other half was placed in plastic sample bags. Sections 0 to 46 feet and 67 to 111 feet of hole CRP-86-01 were sampled in this manner.

In addition, two 100 kg samples of sandstone blocks of minimum 6 inch diameter were collected from the quarry. This material was used to determine the gradation of particle sizes resulting when the sandstone is crushed to minus 2 inches.

Laboratory Analysis

Samples of broken core were submitted to Warnock Hersey Professional Services Ltd., 4 MacDonald Avenue, Dartmouth, Nova Scotia for abrasion loss and soundness loss testing.

The abrasion test was performed on drill core crushed to 3/4 inch then placed in the machine and revolved 500 times with 11 spheres. The loss was measured as the percentage of material passing #12 mesh.

The soundness loss was determined by the 5 cycle sodium sulphate method. The loss was reported as the percentage of material passing the #5 sieve.

Two large samples of sandstone blocks, larger than 6 inches in diameter, were submitted to the Minerals Engineering Centre, TUNS, Halifax, Nova Scotia for gradation analysis. The object of the test was to determine the size fractions obtained after crushing the rock to 2 inches. Originally it was intended to crush the samples to minus 6 inches and minus 4 inches to simulate a crushing operation producing fill. However, this was not possible as no commercial laboratory had the necessary crusher. However, it is possible that the gradation resulting from the minus 2 inch crushed sample may be extrapolated to a minus 4 or 6 inch crusher run.

DISCUSSION OF RESULTS

Diamond Drilling

Three holes, CRP-86-01 to 03 were collared on the English property in the old McKeen Quarry (Figs. 3, 4). They were all drilled to depths of 47.9 metres. The collars of holes CRP-86-01 and 02 are at the same elevation while CRP-86-03 is 1.5 metres lower.

CRP-86-01 was collared in 12.6 metres of pale tan to grey, coarse to medium grained sandstone. Locally thin bands of channel lag conglomerate and shaly beds occur at channel bases. The sandstone is underlain by red brown mottled mudstone and siltstone to a depth of 19.5 metres. This

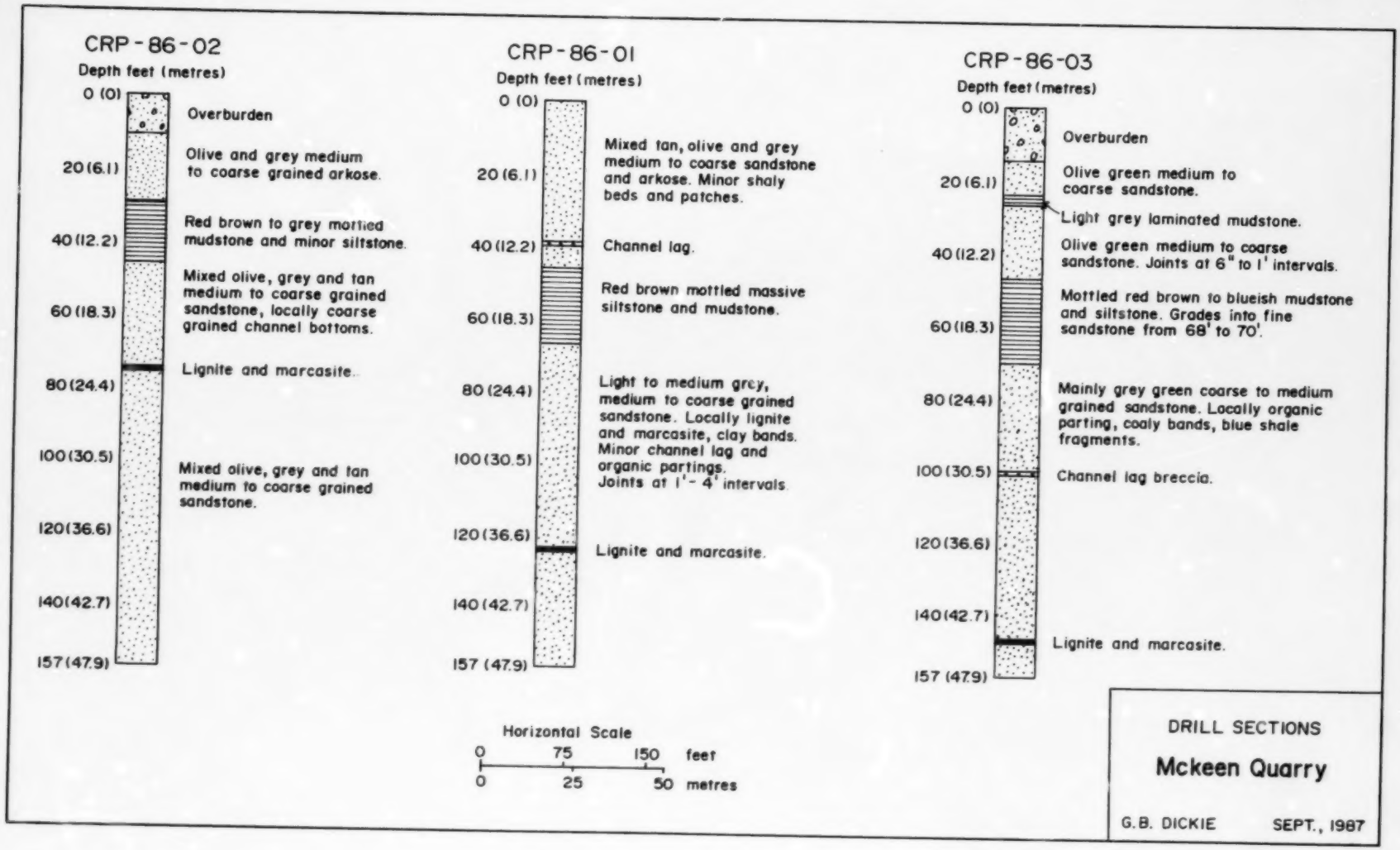

CRP-86-02
Depth feet (metres)
0 (0)
20 (6.1)
40 (12.2)
60 (18.3)
80 (24.4)
100 (30.5)
120 (36.6)
140 (42.7)
157 (47.9)
Overburden
Olive and grey medium to coarse grained arkose.
Red brown to grey mottled mudstone and minor siltstone.
Mixed olive, grey and tan medium to coarse grained sandstone, locally coarse grained channel bottoms.
Lignite and marcasite.
Mixed olive, grey and tan medium to coarse grained sandstone.
CRP-86-01
Depth feet (metres)
Mixed tan, olive and grey medium to coarse sandstone and arkose. Minor shaly beds and patches.
Channel lag.
Red brown mottled massive siltstone and mudstone.
Light to medium grey, medium to coarse grained sandstone. Locally lignite and marcasite, clay bands. Minor channel lag and organic partings. Joints at 1'- 4' intervals.
Lignite and marcasite.
CRP-86-03
Depth feet (metres)
Overburden
Olive green medium to coarse sandstone.
Light grey laminated mudstone.
Olive green medium to coarse sandstone. Joints at 6" to 1' intervals.
Mottled red brown to blueish mudstone and siltstone. Grades into fine sandstone from 68' to 70'.
Mainly grey green coarse to medium grained sandstone. Locally organic parting, coaly bands, blue shale fragments.
Channel lag breccia.
Lignite and marcasite.
Horizontal Scale
0 75 150 feet
0 25 50 metres
DRILL SECTIONS
Mckeen Quarry
G.B. DICKIE SEPT., 1987

Figure 3. Drill sections, McKeen Quarry.

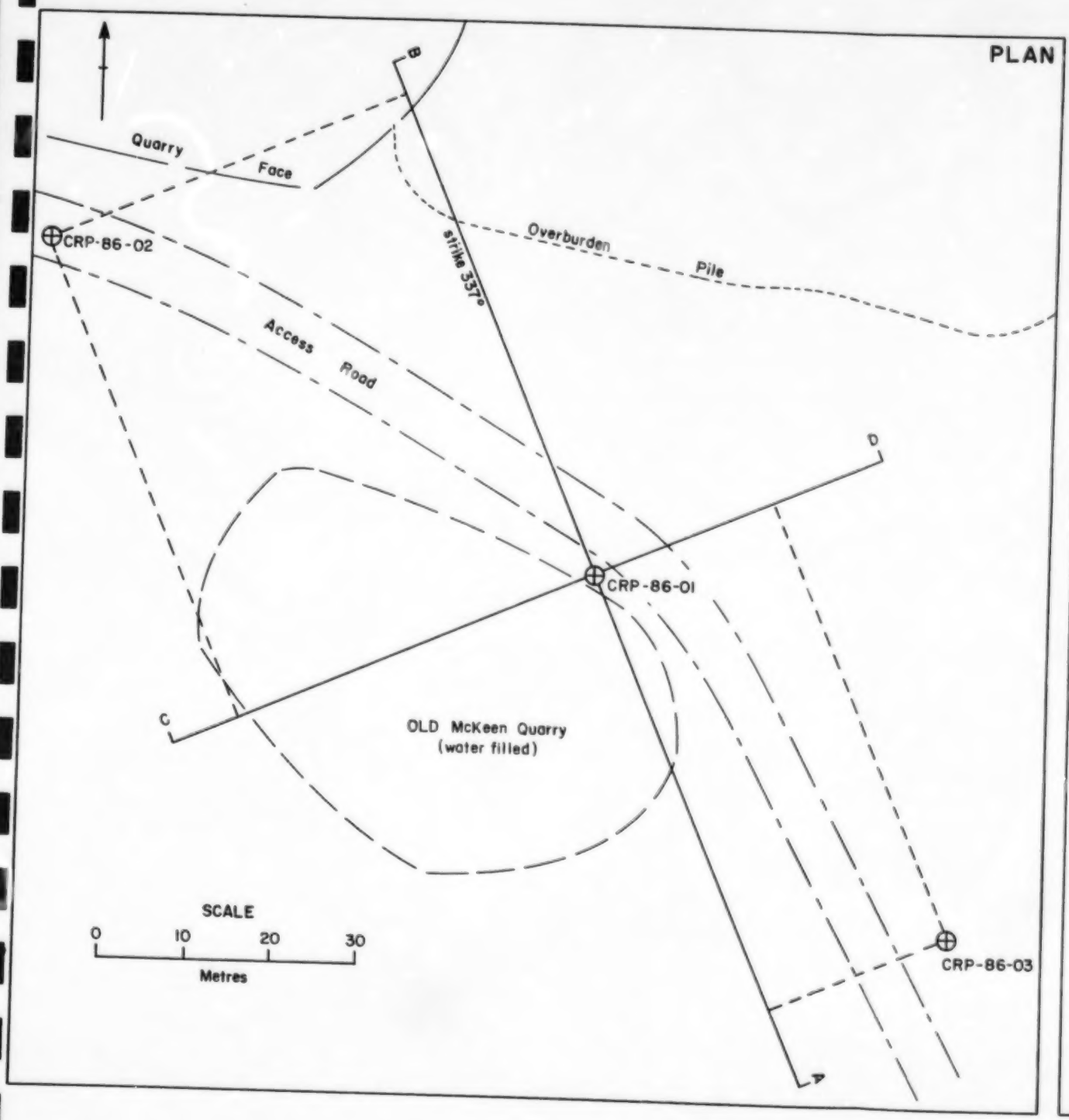
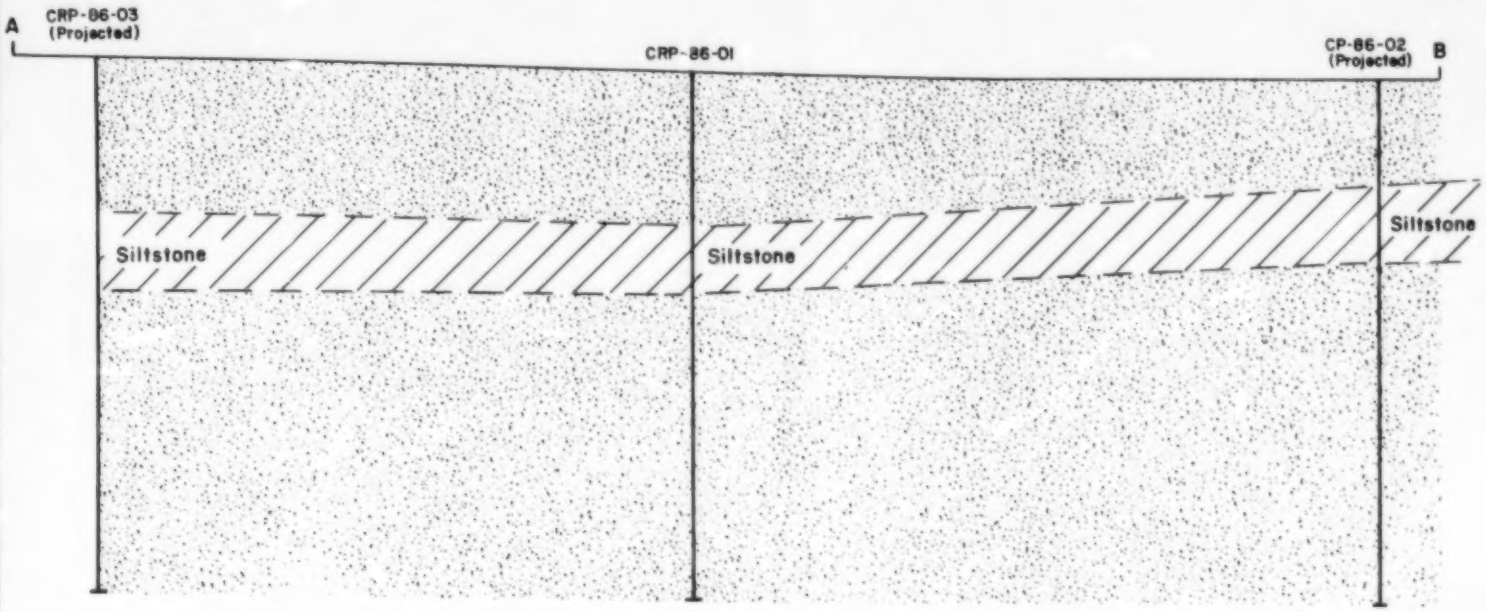
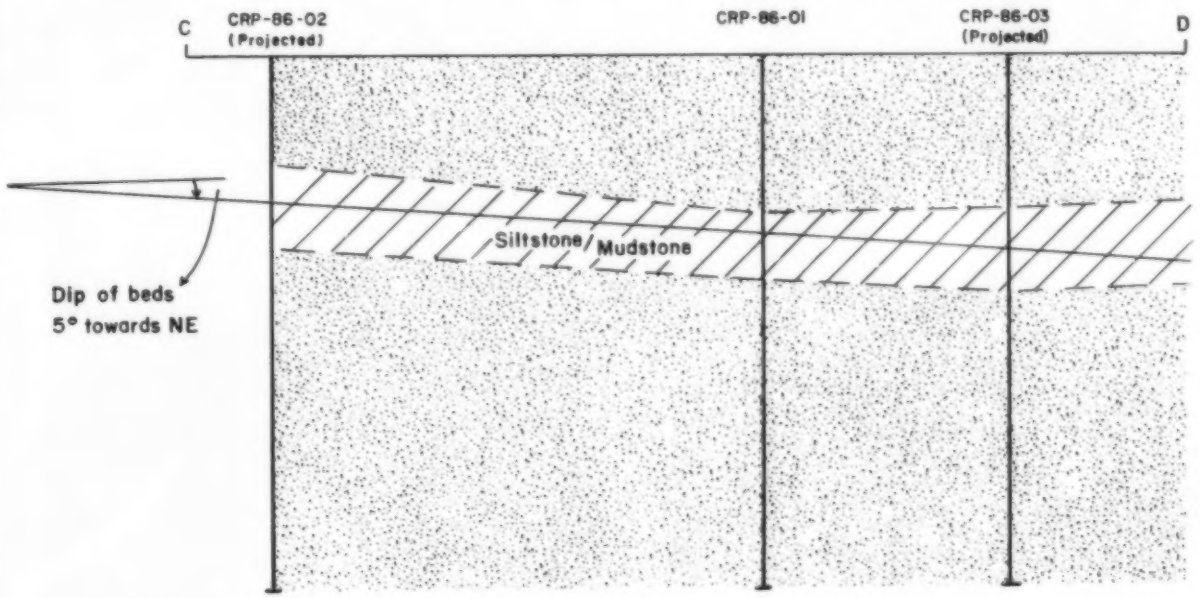


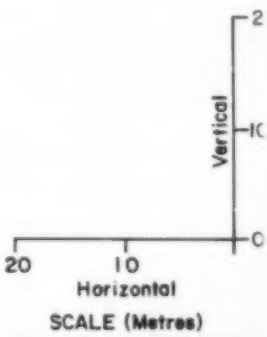
Figure 4. Diamond Drill Holes, McKeen Quarry. Plan and sections .

SECTIOI



SECTION





NOVA SCOTIA DEPT. OF MINES AND ENERGY

DIAMOND DRILL HOLES

McKEEN QUARRY

PLAN AND SECTIONS

G B. Dickie

Sept. 19

is underlain by mixed grey, medium to coarse grained sandstone, arkose and channel lag with minor limy bands with marcasite, pyrite and clay to a depth of 47.9 metres. The sandstone units are competent with joints at 1 to 2 metre intervals.

CRP-86-02 was collared 30 metres northwest of hole CRP-86-01 in 8.8 metres of olive to grey coarse arkose. This is underlain by red brown siltstone to 15.7 metres. This is underlain by olive to grey arkose, sandstone and limy channel lag conglomerate with minor coaly bands to 17.4 metres.

CRP-86-03 was collared 24 metres SE of CRP-86-01 in 14.3 metres of olive to grey coarse sandstone. A band of finely laminated mudstone occurs over the interval 7.2 metres to 8.1 metres. This is underlain by mottled red brown mudstone and siltstone to a depth of 21.3 metres. This is underlain by mixed grey to olive medium to coarse grained sandstone, channel lag and minor mudstone to a depth of 47.9 metres.

Approximately 15 metres of coarse sandstone occurs in the McKeen quarry (Fig. 4) overlying 7 metres of shale. The sandstone strikes towards the northwest and dips 5-10° towards the northeast. Taking into account the 10 metres of sandstone exposed on the quarry face, there could be a thickness up to 25 metres of sandstone available north and northeast of the McKeen Quarry. The dip angle should cause a thickening of the sandstone towards the northeast unless a second shale horizon appears at surface.

Physical Tests

Abrasion Loss. The two samples submitted for testing gave abrasion losses of 66.1% and 62.1% (Table 1), with the poorer result arising from the sample collected over the interval 0 to 46 feet from CRP-86-01. The lower number was obtained from the deeper sample. Considering that the material tested was sandstone, losses of this magnitude are not unusual but are considerably higher than samples taken from the MacKenzie sandstone quarry (Dickie, 1987).

Soundness Loss. Results of the sodium sulphate soundness test (Table 1) vary from 43.6% to 34.6%. The higher number (poorer material) was from the shallow sample. As with the abrasion loss determination, this material has considerably higher soundness losses than the MacKenzie quarry sandstone.

Table 1

Abrasion and Soundness Tests

Lab No.	911	912
Clients Mark	McKeen Quarry #1	McKeen Quarry #2
Drill Hole, Interval	CRP-86-01, 0-46'	CRP-86-01, 67-111'
Abrasion Test		
Grading 3/4" - 1/2", grams	2500	2500
1/2" - 3/8", grams	2500	2500
Revolutions	500	500
Spheres	11	11
Percent passing #12 sieve	66.1%	62.1%
Soundness Test (5 cycles Sodium Sulphate)		
Grading 3/4"-3/8", grams	700	700
3/8"-#4, grams	300	300
Percent passing #5 sieve	43.6%	34.6%

Gradation

In order to determine the size fraction which would result from the quarrying and crushing of the sandstone, approximately 200 kg of rock larger than 6 inch diameter was collected and crushed to pass a 2 inch sieve. The resulting gradation (Table 2) indicates that 47% of the material remains coarser than 3/4 inch and 25.5% is finer than #4 sieve or sand size.

Table 2

Sample: McKeen Quarry Minus 2"

Size	% Retained
1	26.4
3/4	21.3
1/2	14.5
1/4	7.7
#4	4.6
#8	3.6
#16	2.9
#30	3.4
#50	6.0
#100	4.1
#200	1.6
-200	3.9
2"-3/4"	47.7
Minus #4 (sand)	25.5

CONCLUSIONS

Diamond drilling indicates the presence of a large body of sandstone up to 25 metres in thickness, gently dipping 5-10° towards the northeast on the English property, Pictou County. Gradation results indicate that about 25% sand would be generated if the rock were crushed to minus 2 inches in size. Abrasion and soundness losses of over 62% and 34% respectively

indicate that the sandstone is poorly cemented and not durable which is apparent in the drill core. If the quality specifications of the stone are acceptable for specific job requirements, additional drilling and trenching should be carried out north and east of the old McKeen Quarry to be sure the sandstone unit does not pinch out or is otherwise not present.

Reference

Dickie, G. B.

1987: Report on the potential stone quarry, McKenzie Farm, Hardwood Hill, Pictou Co. NSDME OFT 87-005.

Appendix I

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY
DIAMOND DRILL RECORD

PROPERTY: **McKeen Quarry - Pictou** HOLE NO. **CRP-86-01**

Latitude 45° 41' 28.69"	Departure 62° 41' 30.75"	Elevation 27.91m	Section From: 0 To: 62'

Datum	Bearing	Dip -90°	Started (date) 01/04/86	Completed (date) 02/04/86	Ultimate Depth 157'	Proposed Depth 157'

Depth in Feet	FORMATION	Sample Number	Width of Sample	ASSAY VALUES		
0-13	Pale tan coarse gr. sandstone, 7' lost, bedding @					
	75-85° to CA, joints @ 2"-4".					
13-16	Grey-tan med. gr. sandstone. Minor organic partings					
	@ 75°to CA.					
16-19	Tan to coarse sandstone. Minor organic partings.					
	Joints @ 4"-8".					
19-25.6	Med. grey fairly massive med. gr. sandstone.					
	Joints @ 1'-2' intervals.					
25.6-29.8	Light grey med. to coarse sandstone. Channel lag					
	congl. units @ 26.5' and 28'.					
29.8-36.0	Brownish-grey med. to coarse mottled and laminated					
	sandstone. Minor shaly patches and beds.					
36.0-38.5	Lt. grey fine grained sandstone & siltstone.					
38.5-39.5	Brown-tan med.-coarse gr. sandstone.					
39.5-40	Channel lag conglomerate.					
40-41.5	Brown-tan coarse sandstone.					
41.5-46	Lt. grey med.-coarse sandstone. Joints @1'-2' intervals.					
46-51	Brown-red mudstone & siltstone. 5' core missing.					
51-62	Brown-red mottled massive mudstone & siltstone.					

Drilling Performed By - Nova Scotia Department of Mines & Energy Geologist Gordon Dickie

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY
DIAMOND DRILL RECORD

PROPERTY: **McKeen Quarry - Pictou** HOLE NO. **CRP-86-01**

Latitude 45° 41' 28.69"	Departure 62° 41' 30.75"	Elevation 27.91 m	Section From: 62' To: 141'

Datum	Bearing	Dip -90	Started (date) 01/04/86	Completed (date) 02/04/86	Ultimate Depth 157'	Proposed Depth 157'

Depth in Feet	FORMATION	Sample Number	Width of Sample	ASSAY VALUES		
	Variable joints @ 6"-2'.					
62-64	As above.					
64-67	Med. grey fine to med. gr. sandstone. Bedding @ 80° to					
	CA. Joints @ 1' intervals.					
67-85	Grey coarse to med. gr. arkose to sandstone. Minor					
	organic partings @ 75° to CA. Massive core, joints @ 3'					
	intervals.					
85-86	Grey fine gr. sandstone with common organic partings.					
86-101	Med. to light grey coarse gr. arkose. Abund. organic					
	partings @ 75-80° to CA. Massive with joints @ 2'-3'					
	intervals.					
101-105	V. coarse gr. channel arkose with rip up clasts at					
	channel base.					
105-115	Lt. to med. grey med. gr. sandstone. Massive unit with					
	3'-4' joints. Minor bedding @ 75-80° to CA.					
115-124	Med. to lt. grey coarse gr. arkose. Abund. shale frags.					
124-125	Lignite, marcasite, clay.					
125-141	Lt. to med. grey coarse sandstone. Minor micro-					
	conglomerate & organic partings.					

Drilling Performed By - Nova Scotia Department of Mines & Energy Geologist Gordon Dickie

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY
DIAMOND DRILL RECORD

PROPERTY: **McKeen Quarry - Pictou** HOLE NO. **CRP-86-01**

Latitude 45° 41' 28.69"	Departure 62° 41' 30.75"	Elevation 27.91 m	Section From: 141' To: 157'

Datum	Bearing	Dip -90	Started (date) 01/04/86	Completed (date) 02/04/86	Ultimate Depth 157'	Proposed Depth 157'

Depth in Feet	FORMATION	Sample Number	Width of Sample	ASSAY VALUES		
141-157	Med. grey med. to coarse sandstone. Joints @ 1'-4'					
	intervals.					
	End of Hole @ 157'.					

Drilling Performed By - Nova Scotia Department of Mines & Energy Geologist Gordon Dickie

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY
DIAMOND DRILL RECORD

PROPERTY: **McKeen Quarry - Pictou** HOLE NO. **CRP-86-02**

Latitude 45° 41' 29.86"	Departure 62° 41' 33.79"	Elevation 28.01m	Section From: 0 To: 149.5'

Datum	Bearing	Dip -90°	Started (date) 03/04/86	Completed (date) 03/04/86	Ultimate Depth 157'	Proposed Depth 157'

Depth in Feet	FORMATION	Sample Number	Width of Sample	ASSAY VALUES		
0-10	Overburden.					
10-29	Olive & grey med. to coarse arkose. Minor organic part-					
	ings. Quartz clasts common locally. Limy matrix @ 28.8'.					
29-46.5	Red-brown to grey mottled mudstone & minor siltstone.					
46.5-51.5	Red-brown siltstone grades into sandstone.					
	Joints @6"-2'.					
51.5-60	Med. grey med. gr. sandstone. Minor organic partings					
	@ 80° to CA.					
60-70	Olive to brownish med. to coarse sandstone with blotchy					
	organic patches.					
70-73	Lt. grey fine gr. finely lam. sandstone terminates					
	in limy sandstone.					
73-74	Lignite, marcasite in calcareous matrix.					
74-95	Olive coarse arkose. Locally quartz frags. common.					
	Minor organic partings.					
95-105	Med. grey to mottled olive med. to coarse sandstone.					
	Minor organic partings. Joints @ 6"-1'.					
105-110	Olive-brown, coarse gr. arkose. Joints @ 6"-2'.					
110-149.5	Med. grey med. to coarse arkose. Locally very coarse					

Drilling Performed By - Nova Scotia Department of Mines & Energy Geologist Gordon Dickie

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY
DIAMOND DRILL RECORD

PROPERTY: **McKeen Quarry - Pictou** HOLE NO. **CRP-86-02**

Latitude 45° 41' 29.86"	Departure 62° 41' 33.79"	Elevation 28.01 m	Section From: 149.5' To: 157'

Datum	Bearing	Dip -90	Started (date) 03/04/86	Completed (date) 03/04/86	Ultimate Depth 157'	Proposed Depth 157'

Depth in Metres	FORMATION	Sample Number	Width of Sample	ASSAY VALUES		
	channel bottoms. Minor organic partings. Joints @ 6"-2'.					
149.5-151	Med. grey fine gr. sandstone.					
151-157	Med. grey coarse gr. arkose. Channel bottom @ 156.9'.					
	End of Hole @ 157'.					

Drilling Performed By - Nova Scotia Department of Mines & Energy Geologist Gordon Dickie

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY
DIAMOND DRILL RECORD

PROPERTY: McKeen Quarry - Pictou HOLE NO. CRP-86-03

Latitude 45° 41' 27.36"	Departure 62° 41' 28.82"	Elevation 26.65 m	Section From: 0 To: 140'

Datum	Bearing	Dip -90°	Started (date) 04/04/86	Completed (date) 08/04/86	Ultimate Depth 157'	Proposed Depth 157'

Depth in Feet	FORMATION	Sample Number	Width of Sample	ASSAY VALUES		
0-14	Overburden.					
14-23.5	Green-grey med. to coarse gr. sandstone. Blocky w.					
	joints @ 3" intervals. Terminates in 1' of coarse limy					
	sandstone.					
23.5-26.5	Lt. grey finely lam. mudstone. Shaly partings.					
26.5-47	Olive green med. to coarse sandstone. Locally finely					
	lam. with organic parting. Coarse limy sandstone & micro					
	congl. @ 27', 45'. Joints @ 6" to 1' intervals.					
47-70	Mottled red brown-blueish mudstone & siltstone.					
	Joints @ 4"-8" intervals. Changes to f. gr. sandstone					
	from 68'-70'.					
70-100	Mainly grey-green med. gr. sandstone. Abund. organic					
	partings locally. Coarse limy sandstone @ 87' & 93'.					
	Abund. org. @ 94'.					
100-100.5	Blue shale rip up clasts in coarse sandstone matrix.					
100.5-140	Grey med. to coarse gr. sandstone with abund. organic					
	partings. Coarse limy sandstone & conglomerate @					
	114', 126', 136'. Abund. blue shale rip up clasts in					
	limy med. sandstone matrix @ 140'.					

Drilling Performed By - Nova Scotia Department of Mines & Energy Geologist Gordon Dickie

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY
DIAMOND DRILL RECORD

Sheet 2 of 2

PROPERTY: **McKeen Quarry- Pictou** HOLE NO. **CRP-86-03**

Latitude 45° 41' 27.36"	Departure 62° 41' 28.82"	Elevation 26.65 m	Section From: 140' To: 157'

Datum	Bearing	Dip -90	Started (date) 04/04/86	Completed (date) 08/04/86	Ultimate Depth 157'	Proposed Depth 157'

Depth in Feet	FORMATION	Sample Number	Width of Sample	ASSAY VALUES		
140-142	Grey f.-med. gr. sandstone with organic partings.					
142-146	Coarse limy sandstone & congl. with minor organic.					
147.5-148	Coal, marcasite, limy mudstone & calcite.					
148-157	Mixed med. gr. grey sandstone & coarse limy sandstone					
	& conglomerate.					
	End of Hole @ 157'.					

Drilling Performed By - Nova Scotia Department of Mines & Energy Geologist Gordon Dickie

Appendix II

Warnock Hersey Professional Services Ltd.
4 Macdonald Avenue, Dartmouth, Nova Scotia B3B 1C5 (902) 463-6130

50544-C7-026400

AGGREGATE QUALITY REPORT

FOR MINERALS ENGINEERING CENTER, TUNS, HALIFAX, NS ATTN: GORDON DICKIE

Client's P.O. # 015M Laboratory No. 911 Date September 2, 1987

Description of Sample: 15 Kg Split 1" Limestone Core

Type of Mix: HMA & PCC

Source: Marked: McKeen Quarry # 1, 0' - 46'

Sampler: Gordon Dickie Date Received 08-21

Contractor: ---

DATA:

1. Grading Analysis (Lab Crushed 20mm Aggregate)*

% Held 5mm 78.9 % Passing 5mm 21.1 % Passing 80µm 2.5

2. Los Angeles Abrasion Test

Grading B Percent Loss after 500 revolutions 66.1

3. Soundness (5 cycles of Sodium Sulfate) *

Total Weighted Loss of Coarse Aggregate, Percent 43.6

4. Petrographic Analysis (Modified D. H. O. Method)

Proportional Petrographic Number --

5. Bulk Relative Density — 23/23°C --

6. Water Absorption — % Dry --

7. Particle Description

Shape Half round (from core) Percent Crushed Particles 100

SUITABILITY:

☐ Meets Department Specifications:

☑ Fails to meet Specifications because:*

Abrasion loss exceeds 35%

Soundness loss exceeds 15%

REMARKS: * See detailed analysis, attached.

K.R. Mosher, C.E.T., Supervisor

LABORATORY SUPERVISOR

Wamock Hersey Professional Services Ltd.
4 MacDonald Avenue Dartmouth Nova Scotia B3B 1C5 (902) 463-6130

50544-C7-026400

AGGREGATE GRADATION TEST DATA

CLIENT: Minerals Engineering Center, TUNS
Attn: Mr. Gordon Dickie

DATE: September 2/87

SAMPLE NOS.

MATERIAL SOURCE/DESCRIPTION: 15 Kg Limestone, 1" Split Core — 911

SAMPLED/SUBMITTED BY: Gordon Dickie on August 21

Analysis of Lab Crushed 20mm Aggregate

SAMPLE NO.		911								
SIEVES	CSSS mm/µm	% RETAINED	CUM % PASSING	% RETAINED	CUM % PASSING	% RETAINED	CUM % PASSING	% RETAINED	CUM. % PASSING	SPECIFICATION % PASSING
3	80									
2	56									
1 1/2	40									
1	28		100.0							
3/4	20	2.9	97.0							
1/2	14	27.6	70.4							
3/8	10	33.5	36.9							
4	5	15.8	21.1							
8	2.5	5.1	15.0							
16	1.25	3.3	12.7							
30	630	2.2	10.5							
50	315	2.9	7.6							
100	160	2.9	4.7							
200	80	2.2	2.5							
-200	-80	2.5	--							
Total		100.0	--							

REMARKS:

TECHNICIANS: L. Blondin

SUPERVISOR: K.R. Nosher, C.E.T.

Warnock Hersey Professional Services Ltd.

50544-C7-026400

SOUNDNESS TEST FIVE CYCLE SODIUM SULFATE

ANSI/ASTM DESIGNATION C-88- 83

CLIENT: Minerals Engineering Center, TUNS DATE: 87-08-02

CONTRACT NO: Private

NAME OF PIT: Marked: McKeen Quarry # 1; 0' - 46'
Limestone Core

Sample No. 911		Description of Material Stone Fraction (78.9%) of Lab Crushed 20mm Aggregate		
Sieve Size Held On	% Loss Each Frac.	Original Grading Percent	(mm)	Percent Loss Weighted on Original Grading
Coarse Aggregate				
1"				
3/4"	(40.9)	(20)	2.5	
1/2"		(14)	35.0	
3/8"	40.9	(10)	42.5	32.7
No. 4	54.7	(5)	20.0	10.9
TOTALS	95.6		100.0	43.6

Mode of Failure: Powdering and pitting
Breakage of larger pieces.

Warnock Hersey Professional Services Ltd.
4 Macdonald Avenue, Dartmouth, Nova Scotia B3B 1C5 (902) 463-6130

50544-C7-026400

AGGREGATE QUALITY REPORT

FOR MINERALS ENGINEERING CENTER, TUNS, HALIFAX, NS ATTN: GORDON DICKIE

Client's P.O. # 0159M Laboratory No. 912 Date 87-08-02

Description of Sample: 20 Kg Split 1" Limestone Core

Type of Mix: HMA & PCC

Source: Marked: McKeen Quarry # 2, 67' - 111'

Sampler: Gordon Dickie Date Received 87-08-21

Contractor: ----

DATA:

1. **Grading Analysis** (Lab Crushed 20mm Aggregate)*
   % Held 5mm 85.6 % Passing 5mm 14.4 % Passing 80µm 2.6
2. **Los Angeles Abrasion Test**
   Grading B Percent Loss after 500 revolutions 62.1
3. **Soundness (5 cycles of Sodium Sulfate)***
   Total Weighted Loss of Coarse Aggregate, Percent 34.6
4. **Petrographic Analysis (Modified D. H. O. Method)**
   Proportional Petrographic Number --
5. **Bulk Relative Density — 23/23°C** --
6. **Water Absorption — % Dry** --
7. **Particle Description**
   Shape Half round (from core) Percent Crushed Particles 100

SUITABILITY:

☐ Meets Department Specifications:

☑ Fails to meet Specifications because:

Abrasion exceeds 35%

Soundness exceeds 15%

REMARKS: * See detailed analysis, attached.

K.R. Mosher, C.E.T., Supervisor
LABORATORY SUPERVISOR

DISTRIBUTION: (1) A.D.C.
(1) R.C.E.
(1) R.E.
(1) Supervisor

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AGGREGATE GRADATION TEST DATA

CLIENT: Minerals Engineering Center, TUNS
Attn: Mr. Gordon Dickie

DATE: Sept.2/87

SAMPLE NOS.

MATERIAL SOURCE/DESCRIPTION: 20 Kg Split 1" Limestone Core
Marked: McKeen Quarry #2, 67' - 111' 912

SAMPLED/SUBMITTED BY: Gordon Dickie on 08-21

ANALYSIS OF LAB CRUSHED 20mm AGGREGATE

SAMPLE NO.		912								
SIEVES In.	CSSS mm/µm	% RETAINED	CUM. % PASSING	% RETAINED	CUM % PASSING	% RETAINED	CUM % PASSING	% RETAINED	CUM. % PASSING	SPECIFICATION % PASSING
3	80									
2	56									
1 1/2	40									
1	28		100.0							
3/4	20	1.2	98.8							
1/2	14	26.0	72.8							
3/8	10	42.2	30.6							
4	5	16.2	14.4							
8	2.5	3.6	10.8							
16	1.25	1.6	9.2							
30	630	0.9	8.3							
50	315	1.6	6.7							
100	160	2.3	4.4							
200	80	1.8	2.6							
-200	-80	2.6	--							
Total		100.0	--							

REMARKS:

TECHNICIANS: L. Blondin

SUPERVISOR: K.R. Mosher, C.E.T.

Warnock Hersey Professional Services Ltd.

50544-C7-026400

SOUNDNESS TEST FIVE CYCLE SODIUM SULFATE

ANSI/ASTM DESIGNATION C-88- 83

CLIENT: Minerals Engineering Center, TUNS DATE: 87-08-02

CONTRACT NO: Private

NAME OF PIT: Marked: McKeen Quarry # 2, 67' - 111'
Limestone Core

Sample No. 912		Description of Material Stone Fraction (85.6%) of Lab Crushed 20mm Aggregate	
Sieve Size Held On	% Loss Each Frac.	Original Grading Percent (mm)	Percent Loss Weighted on Original Grading
Coarse Aggregate			
1"			
3/4"	(32.3)	(20) 1.4	
1/2"		(14) 30.4	
3/8"	32.3	(10) 49.3	26.2
No. 4	44.3	(5) 18.9	8.4
TOTALS	76.6	100.0	34.6

Mode of Failure: Powdering and pitting.

MINERALS ENGINEERING CENTRE

Technical University of Nova Scotia
P. O. Box 1000 Halifax Nova Scotia
Canada B3J 2X4
Telephone: (902) 429-8300
Telex: (TUNS) 019-21566

14 September, 1987

Nova Scotia Dept. of Mines and Energy
P.O. Box 1087
Halifax, N.S.
B3J 2X1

Attention: G. Dickie

RE: Results of crushing and screen analysis on sample.
Sample weight: 149.46 Kg.

Sieve	%
+ 1"	26.4
-1" + 3/4"	21.3
-3/4" + 1/2"	14.5
-1/2" + 1/4"	7.7
-1/4" + No. 4	4.6
-No. 4 + No. 8	3.6
-No. 8 + No. 16	2.9
-No. 16 + No. 30	3.4
-No. 30 + No. 50	6.0
-No. 50 + No. 100	4.1
-No. 100 + No. 200	1.6
- No. 200	3.9

Cyril Cole

C. Cole
Minerals Engineering Centre